Mumps

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Mumps is caused by mumps virus (genus *Paramyxovirus*, family *Paramyxoviridae*).

B. Clinical Description

Mumps is a systemic disease characterized by swelling of the salivary glands, which usually lasts several days. However, about one-third of infections do not cause clinically apparent salivary gland swelling. Meningeal signs are common. Encephalitis occurs rarely, and permanent sequelae or death is uncommon. Infection in adulthood is likely to produce more severe disease, including mastitis, which occurs in up to 31% of females aged > 15 years, and orchitis, which occurs in 20–30% of post-pubertal males. Other rare complications include arthritis, renal involvement, myocarditis, cerebellar ataxia, pancreatitis, and hearing impairment. Mumps infection during the first trimester of pregnancy can increase the risk of spontaneous abortion, although no evidence exists that mumps infection in pregnancy causes congenital malformations. While death due to mumps is rare, more than half the fatalities occur in those $\geq$ 19 years of age.

Note: Swelling of the salivary glands can also be caused by parainfluenza virus types 1 and 3, influenza A, Coxsackie A, echovirus, lymphocytic choriomeningitis virus, HIV, and noninfectious causes such as drugs, tumors, immunologic diseases, and obstruction of the salivary duct.

C. Reservoirs

Humans are the only host.

D. Modes of Transmission

Mumps is transmitted person-to-person by droplet or direct contact with nasopharyngeal secretions of an infected person, and by the airborne route.

E. Incubation Period

The incubation period is usually 16–18 days, with a range of 12–25 days.

F. Period of Communicability or Infectious Period

The infectious period is from 7 days *before* onset of parotid swelling through 9 days *after* onset of parotid swelling. Maximum infectiousness occurs between 2 days before to 5 days after onset of illness. The initial day of swelling should be counted as day zero. Mumps is similar to influenza and rubella in infectiousness and not as contagious as measles or chickenpox.

G. Epidemiology

Mumps occurs worldwide. In the United States, it is endemic year-round, peaking in winter and spring. Eighty-five percent of adults have serologic evidence of immunity. About one-third of infections do not cause apparent parotitis but can still transmit disease; most infections in children < 2 years of age are subclinical. The incidence of mumps in the US has declined since the vaccine came into usage in 1967. In 1986 and 1987 there was a relative resurgence of mumps, apparently due to the absence of comprehensive state immunization requirements as well as, in some instances, vaccine failure. The number of mumps cases reported in the US has declined steadily since 1989, thanks in large part to the two-dose MMR vaccination policy. However, outbreaks

in highly vaccinated populations still occur, probably due to vaccine failure. Massachusetts has had fewer than 10 reported cases per year since 1991.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- A suspect or confirmed case of mumps, as diagnosed by a healthcare professional, or
- Isolation of mumps virus from clinical specimen, or
- Significant rise between acute- and convalescent-phase titers in serum mumps IgG antibody level by any standard serologic assay, or
- Positive serologic test for mumps IgM antibody.

Note: See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

1. **Serologic Testing**
   - **Mumps IgG paired-titer testing—**The Massachusetts State Laboratory Institute (SLI) performs this test, which is more reliable than mumps IgM tests performed by commercial laboratories. Acute serum should be collected as soon as possible after onset of parotid swelling; convalescent serum should be collected about 14 days later.
   - **Mumps IgM test—**False positive mumps IgM results by immunofluorescent antibody assays (IFA) have been reported, and MDPH does not recommend mumps IgM testing by commercial laboratories. Serum submitted to SLI for mumps IgM detection will be forwarded to the Centers for Disease Control and Prevention (CDC). The specimen for mumps IgM testing by the CDC should be drawn at any time between the day of onset of parotitis to a month after onset. However, specimens drawn $\geq$ 3 days after onset are less likely to yield false negative results. The amount of serum required is $\geq$ 2 ml.
   - **Shipment of sera—**Sera should be sent on a cold pack, with a completed virus serology requisition form, to: Virus Serology Laboratory, State Laboratory Institute, 305 South Street, Jamaica Plain, MA 02130. Before sending, please call an immunization epidemiologist at (617) 983-6800**.**

2. **Virus Isolation/Molecular Characterization of Mumps—**Virus isolation is much less useful for disease control purposes than serologic testing because results are not available for several weeks. However, molecular characterization of isolated mumps virus can be useful in epidemiologic investigation; for example, to determine source of the infection and which cases and outbreaks are linked to each other. Specimens submitted to the SLI for mumps virus isolation will be forwarded to CDC. Contact an immunization epidemiologist at (617) 983-6800 for instructions on specimen collection and shipment.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify cases and susceptible exposed people rapidly and to prevent further spread of the disease.
- To confirm mumps infection as the cause of parotitis.
- To distinguish between failure to vaccinate and vaccine failure and address the problem.

B. Laboratory and Healthcare Provider Reporting Requirements

Refer to the lists of reportable diseases (at the end of this manual's Introduction) for specific information.

C. Local Board of Health Reporting and Follow-up Responsibilities

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300.100*) stipulate that each local board of health (LBOH) must report the occurrence of any suspected or confirmed case of mumps reported to it (as defined by the reporting criteria in Section 2) A above). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

Note: Due to national surveillance and reporting requirements, the Massachusetts Immunization Program (MIP) takes the lead on mumps case investigation (including filling out the official case report form) and disease control recommendations, in collaboration with the local board of health. MIP will keep the local board of health informed of all significant developments and will request the assistance of the board of health as needed.

D. Initial Questions to Ask Healthcare Provider and Patient

In order to assess the likelihood that a suspect case is a true case prior to laboratory testing, MIP and/or other public health staff helping in the investigation should ask about: 1) symptoms, 2) mumps immunization history, 3) recent history of dental work, 4) recent history of travel (to where and dates), 5) whether there were any recent out-of-town visitors (from where and dates), and 6) whether there was any recent contact with anyone with similar symptoms.

4) CONTROLLING FURTHER SPREAD

This section provides detailed control guidelines that are an integral part of case investigation. LBOHs should familiarize themselves with the information. However, the Massachusetts Immunization Program will take the lead on implementing control measures, in collaboration with the board of health.

A. Isolation and Quarantine Requirements (*150 CMR 300.200*)

Minimum Period of Isolation of Patient

Through 9 days after onset of gland swelling.

Minimum Period of Quarantine of Contacts

Healthcare workers or students born after 1956 who are not appropriately immunized or do not have serologic evidence of immunity will be excluded from work or classes from the 12th through the 26th day after their last exposure. When multiple cases occur, susceptibles need to be excluded through 26 days after the onset of the last case at the school or workplace.

B. Protection of Contacts of a Case

1. **Implement control measures *before* serologic confirmation.**
2. **Inquire about contact with a known or suspected case or travel during the mumps exposure period (16–25 days prior to onset).**
3. Identify all those exposed. To identify exposed, think in terms of the "zones of exposure" and consider members of the following groups, if they were in contact with the case during his/her infectious period:
   - Household members
   - School/daycare (students and staff)
   - Staff and patients at medical facility where patient was seen
   - Individuals at workplace of case (especially daycare centers, schools, and medical settings)
   - Religious/social groups
   - Sports teams and other extracurricular groups
   - Bus/carpool mates
   - Close friends
   - Persons potentially exposed at social events, travel sites, etc.

4. Identify high-risk susceptibles who had contact with the case during infectious period:
   - Pregnant women should be referred to their obstetrician for screening and management. (In daycare or school settings, remember to determine whether any teachers, student teachers, staff, or students are pregnant.)
   - Immunosuppressed individuals should be referred to their healthcare provider.
   - Infants <12 months of age should be referred to their pediatrician.
5. Identify all other susceptibles. These are individuals without proof of immunity, including those with medical or religious exemptions to immunization. Proof of immunity is defined as:

PROOF OF IMMUNITY TO MUMPS
• Birth in the US before 1957, **unless** a health-care worker or a college student, or • Documentation of ≥ 1 dose mumps-containing vaccine on or after the first birthday, or • Serologic proof of immunity.

6. Immunize all susceptibles ≥ 12 months of age for whom MMR is not contraindicated. Please review "MMR Vaccine Concerns" in Attachment A (at the end of this chapter). Keep in mind the following:
   - The combination MMR vaccine is the preferred formulation for all those ≥ 12 months of age. (MMR vaccine should never be given to infants.)
   - Vaccinating an exposed individual who may be incubating mumps virus is not harmful (although mumps-containing vaccine, unlike measles vaccine, will not prevent acquisition of disease after infection). Exposed individuals should be vaccinated to protect against subsequent exposures.
   - Immune globulin (IG) is of no value as post-exposure prophylaxis and is not recommended.
7. Exclude as follows:
   - Case: Exclude through 9 days after onset of parotitis (counting the day of swelling onset as day zero). The suspect case may return to normal activities on the 10th day.
   - Contacts:
     - Exclude susceptibles (including those with medical or religious exemptions) on days 12–26 after their last exposure or, if there are multiple cases, for 26 days after onset of parotitis in the last reported case in the outbreak setting. They may return on the 27th day.
     - Excluded susceptibles may be readmitted immediately after vaccination. However, due to the relatively long incubation period of mumps, cases can be expected to occur for approximately 3 weeks following vaccination.
8. Conduct active surveillance for mumps for 2 incubation periods (50 days) after onset of the last case.

C. Managing Mumps in Healthcare Settings

1. Proof of immunity: Although birth in the US before 1957 is generally considered acceptable evidence of immunity to mumps, many experts believe this criterion is not sufficiently reliable for healthcare settings. Therefore, all healthcare workers should have documentation of at least one dose of mumps-containing vaccine on or after the first birthday or serologic proof of immunity. An effective routine MMR vaccination program for healthcare workers (in addition to standard precautions) is the best approach to prevent nosocomial transmission.
2. Isolation of patients:
   - Patients should be placed on droplet precautions through 9 days after onset of parotid swelling (counting the day of onset as day zero). They may be taken off precautions on the 10th day.
   - Exposed susceptible patients should be placed on droplet precautions from the 12th day after the earliest exposure through the 26th day after the last exposure. They may be taken off precautions on the 27th day.

3. Exclusion of staff:
   - Personnel who become sick should be excluded from work through 9 days post parotid swelling onset. They may return on the 10th day.
   - Exposed susceptible personnel (including those with medical or religious exemptions) should be excluded from the 12th day after their first exposure through the 26th day after their last exposure. They may return on the 27th day.
4. Surveillance: Conduct active surveillance for mumps for 2 incubation periods (50 days) after onset of the last case.

D. Preventive Measures

Personal Preventive Measures/Education

Vaccination, including routine childhood vaccination, catch-up vaccination of adolescents, and targeted vaccination of high-risk adult groups, is the best preventive measure against mumps. Good personal hygiene (which consists of proper hand washing, disposal of used tissues, not sharing eating utensils, etc.) is also important. Please refer to the most current versions of the ACIP statement on measles, rubella, and mumps (listed under References, below), MDPH's *Immunization Guidelines,* and MDPH's *Massachusetts Immunization Program-Supplied Vaccines and Patient Eligibility Criteria* for details about MMR vaccine, the recommended schedule, who should and should not get the vaccine, and who is eligible to receive state-supplied vaccine. These as well as other relevant resources are available through the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

A *Mumps Public Health Fact Sheet* for the general public can be obtained from the Division of Epidemiology and Immunization or through the MDPH website at <http://www.state.ma.us/dph/>. Click on the "Publications" link and scroll down to the Fact Sheets section.

ADDITIONAL INFORMATION

The following is the formal CDC surveillance case definition for mumps. It is provided for your information only; it is not necessary to use this information in reporting or investigating a case. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting a case to the MDPH, always use the criteria in Section 2) A of this chapter.

Case Definition for Mumps (as defined by CSTE, 1999)
Clinical case definition

An illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting $\geq$ 2 days, and without other apparent cause.

Laboratory criteria for diagnosis

- Isolation of mumps virus from clinical specimen, or
- Significant rise between acute- and convalescent-phase titers in serum mumps immunoglobulin G (IgG) antibody level by any standard serologic assay, or
- Positive serologic test for mumps immunoglobulin M (IgM) antibody.

Case classification

Probable: A case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically linked to a confirmed or probable case.
Confirmed: A case that is laboratory-confirmed or that meets the clinical case definition and is epidemiologically linked to a confirmed or probable case. A laboratory-confirmed case does not need to meet the clinical case definition.

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Attachment A: MMR Vaccine Concerns (5 pages)

Note: Attachment A is a separate PDF file. You must go back to the *Guide to Surveillance and Reporting* main page, click on the L–M drop down menu, and then click on this attachment under Mumps.